DOCUMENT RESUME

ED 318 812 UD 027 380

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TITLE Student Selection for Selective Educational Programs Using Multiple Criteria.
PUB DATE 8 Apr 88
NOTE 37p.; Paper presented at the Annual Conference of the International Association for Computing in Education (New Orleans, LA, April 8, 1988).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Compensatory Education; *Computer Oriented Programs; Computer Software; *Computer Uses in Education; *Educational Diagnosis; *Selective Admission; *Spreadsheets; *Student Placement
IDENTIFIERS *Education Consolidation Improvement Act Chapter 1

ABSTRACT

This paper shows that multiple sources of data reflecting educational progress may be used with relative ease to systematically, objectively, and accurately place students in selective educational programs, such as those funded under Chapter 1 of the Education Consolidation and Improvement Act, using readily available commercial microcomputer programs. The following process is outlined: (1) choosing types of information for selection; (2) obtaining the statistical data; (3) preparing the statistical data for analysis; (4) analyzing the data to determine relative need; (5) developing the composite score; and (6) analyzing the composite score using a commercially-available microcomputer spreadsheet program, including setting up the spreadsheet, developing the computational overlay, entering the computational formulas, entering the student data, and sorting the student lists. The following materials are appended: (1) a list of three references; (2) a student selection checklist used in Lake County (Florida); (3) an example of the student statistical data generated by the computer program; (4) instructions for setting up Lotus data files from a main frame computer; and (5) descriptions of seven technical reports that can be generated using the program. (FMW)

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STUDENT SELECTION FOR SELECTIVE EDUCATIONAL PROGRAMS USING MULTIPLE CRITERIA

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Presented at the

International Association for Computing in Education
New Orleans, Louisiana

April 8, 1988

UD 027 380

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Introduction

The purpose of any student selection system is to assure to the greatest extent possible that eligible children placed into selective educational programs are those who have greatest need for the program services and who would benefit most by participating in the instruction provided. Title I of the Elementary and Secondary Education Act (ESEA) of 1965, and its successor, Chapter 1 of the 1980 Education Consideration and Improvement Act (ECIA) require that supplementary compensatory basic skill instructional services be offered to children in eligible school districts throughout the nation on the basis of educational need.

Eligibility and, consequently, need under ECIA is essentially defined as under-achievement compared to that normally expected from a child of similar age within the grade level in which the child is located. Children are to be selected for participation in the program based on the relative extent of their educational deprivation, with those demonstrating greatest need being served first.

Historically, selection of underachieving students has been accomplished in both programs using single source measures of educational deprivation, most commonly, nationally standardized norm-referenced achievement test scores.

Ample evidence now exists, however, which indicates that the use of any single measure of educational status for selection and placement of children into special programs is likely to result in substantial numbers of erroneous selections. These errors, in turn, result in undue subsequent classroom turmoil as initially misplaced children are relocated into programs more appropriate to their educational needs and skills.

In ECIA Chapter 1 programs, the effects of such disruptions can be educationally devastating to the very children needing stability the most. In addition, where relocation does not occur, a child's entire future could well be affected by the placement decision. Further, parents rightly feel very uneasy with a process in which their children are placed or not placed into educational programs based upon a single index of achievement, whatever its form.

This paper will show that multiple sources of data reflecting educational progress, or the lack thereof, may be used with relative ease to systematically, objectively, and accurately place children into selective educational programs such as Chapter 1, using readily available commercial microcomputer programs.

The underlying premise of multiple criteria selection is that the more information considered when determining educational need, the greater the chance of correct instructional placement. The conditions necessary for this premise to be valid are that the information utilized for placement must be both relevant and current.

The procedures outlined in this paper were developed specifically to improve student selection for participation in Chapter 1 supplemental compensatory education programs, but the process described is applicable for the identification and ranking of children for any selective program. However, *for illustrative purposes, all discussion which follows will pertain to selection of children for participation into ECIA Chapter 1 programs.*

Choosing Types of Information For Selection

Although standardized tests may contribute some useful information about the achievement level of individual children in the basic skills, the tests were primarily designed to measure and report on group performance. Published reliability coefficients reflect data from norm groups and are applicable to local situations only to the extent that the local class being measured is similar to the pertinent norm group and to the extent that the tests are administered in accordance to the standard procedures outlined by the publishers.

Because of these and other factors, the actual reliability of a single test score for an individual child is, for the most part, unknown and possibly quite low. This would be particularly true for children who typically score at the lower end of a score distribution.

Consequently, information inferred from this index has the potential to substantially distort the true achievement level of an individual child. Therefore, criteria to be used in selecting individual children for special instructional services should include as much relevant information about the child as is feasible and should include a perspective of child performance over a span of time.

The ideal arrangement exists when each type of information included in the analysis is directly related to achievement but is not redundant with other included information. For example, weak oral reading performance and low achievement test scores may both be indicative of need for supplementary reading instruction, but the two indicators may not closely interrelate. Because of a low interrelationship, each could contribute additional information about a child thereby enhancing the reliability of the set of information.

Therefore, when deciding upon types of achievement indicators for use in identifying and rank ordering children for selective instructional program participation, one should look for information which is indicative of the child's most current classroom performance and data which reflects performance over a reasonable span if time.

Basically, any available information which reflects a child's achievement, to include teacher professional judgment, may be validly incorporated into the selection system. Checklists, teacher notes, parental comments, attendance records, basal reading levels, grade progression, attendance patterns and so forth may all provide valuable input into the decision process. Again, the key determinants for choosing information sources are that they (1) provide current assessments of the child and (2) can be judged to significantly relate to student achievement.

Obtaining The Data

Once the types and sources of information (criteria) to be included in the selection process have been chosen, the next step is to gather, quantify and scientifically analyze the resultant data. We readily acknowledge that not everything important to basic skill achievement may be quantified, but to assure equitability, selection must be accomplished through uniform, systematic and objective means. The appropriate application of logic and mathematical rules to collected data meets these requirements.

A number of conventions already exist for quantifying qualitative data. For example, rating scales, ratios, checklists, test scores, and criteria to which values (e.g. grades) are assigned are very commonly used for judging specific or if desired, general skill proficiency levels. A summary of educational deprivation from such data could be computed in the form of a profile reflecting diagnostic detail about a child's achievement skills or in the form of a weighted aggregate (composite) score. For selection into Chapter 1 programs, this latter index is suitable.

Getting The Data Ready For Analysis

Once the desired student data have been systematically recorded (perhaps on a form as in our example), the data should be quality checked to assure that they have been recorded properly and completely according to instructions. Best procedures have the forms checked for completeness and accuracy at least twice, perhaps at both the building and the central administrative office levels. When this has been done, the data may be entered into the microcomputer or onto a main frame computer data tape for analysis.

For organizational efficiency, Chapter 1 data sets should probably be entered separately for each grade level by basic skill subject. For example, 4th grade Reading data should be entered separately from the 5th grade Reading data, 4th grade Reading data should be entered separately from 4th grade Math data, and so forth. This will facilitate ranking students according to educational need on a district-wide as well as building-by-building basis.

Analyzing The Data To Determine Relative Need

The analysis presented below can be accomplished on most of the currently available microcomputer commercial spreadsheet programs. This paper will discuss only the use of LOTUS 1-2-3 (TM) since it is the program at hand. However, this use should not be construed as an endorsement of this particular program.

The Data Source. For our illustrations we will use actual but anonymous student data draw from use of a Student Selection Checklist developed and validated by the Lake County, Florida School Board (1) with the assistance of the Chapter 1, Region 3 Technical Assistance Center. A copy of the form is located in Appendix A. This form has been adopted for use in one version or another by school districts throughout the State of Florida and by a number of other school systems across the country.

The student selection form provides category scores for each of four different indicators of basic skill achievement: Standardized Tests, Student Behavioral Characteristics, Current Student Data, and Teacher Recommendations. The metric analyzed from standardized tests in our example are Normal Curve Equivalents (NCEs) from the Title I Evaluation and Reporting System (TIERS), created for evaluating Chapter 1 (then Title I) programs. NCEs are derived from the Percentile Rank scale.

Data Acquisition. During the late portion of the spring term of each school year, regular classroom teachers are provided with forms for all eligible children and asked to complete them. The teachers are instructed to enter a check mark opposite each item in Category II (Student Behavioral Characteristics) which is reflective of the particular child being assessed relative to children who are succeeding in regular classroom settings, and Category III (Current Student Data) using available classroom and current, relative information from school cumulative folders and other records.

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(1) - Grateful appreciation is extended to the Lake County, Florida School Board for permission to use their Student Selection Form in this paper.

The teachers then select a rating value which reflects their perception of the degree to which a child needs Chapter 1 type of service, in the Teacher Recommendation category. The forms are then turned into the building central office. At this time standardized test scores are entered onto the forms. This is procedure is followed to preclude the possibility of test scores influencing teacher judgment on the other categories.

Developing The Composite Score

The first activity in developing the composite score is to determine the relative importance of each type of information used. This analysis requires one to establish the exact weight that each category score is to contribute to the student's total (composite) score. The amount of the contributions are determined by exercising professional judgment. We believe that this should be a collective decision. (2) The only statistical restriction to this process is that the sum of the weights (entered as proportions) must equal 1.00.

If no weights are deliberately assigned, default weights are automatically determined by the size of the range of potential values associated with each category of information. Default weightings could destroy the validity of the selection process.

As an example, we might choose to weight each of the four variables (categories) listed on our form as follows:

Category	Weight or Contribution
Test Score	30%
Behavioral Characteristics	25%
Current Student Data	20%
Teacher Recommendation	25%
Total of the Contributions	100%

---

(2) - Although methods for determining such weights are of extreme importance to the success of this system, the appropriateness of techniques for their determination are unique to the type of selective educational program involved, and are beyond the scope of this paper. Thus, they are not discussed herein.

During the analysis, the respective weights will be multiplied to teacher recorded category scores to obtain weighted category scores. Finally, the weighted category scores of each child will be added together by the computer to obtain a composite score for each individual.

The second decision which needs to be reached is relatively simple: establishing the maximum size of the composite score. Since these scores have no inherent or direct interpretation from an absolute sense, the size of the maximum value need only be sufficient to be able to rank the largest number of children who will be considered at any one time. For Chapter 1, this should consist of a district-wide grade level, for a basic skill subject.

The maximum possible composite score should be of such size as to reduce the probability of tied ranks and to have values which will not be cumbersome relative to the number of children involved. For example, if scores of only 200 children are to be sorted, a maximum composite score of 250 should suffice.

Once composite scores have been calculated for all children across the school district for a grade level by basic skill subject, you may rank order them according to the size of the composite score. Larger composite scores indicate greater need. Thus, they may be ranked reflecting either greatest need to least (descending order) or in reverse (ascending) order.

The next step is to review the district-wide listing of student scores and determine the program participation cutoff composite score for each group of children. This is usually determined by the level of funding awarded to a school district for Chapter 1 program use and program offerings based on local needs assessments. If you are dissatisfied with the outcome of any of the listings, you may change category weightings and rerun new listings as desired.

If you believe that the lists validly reflect the relative needs of eligible children, you may proceed to sort and print student lists reflecting order of need (alphabetically, if you wish) by school building, subject matter, grade level, or any combination of these groupings appropriate, for distribution to district teachers and principals.

THE COMPOSITE SCORE ANALYSIS

Step 1: Set Up the Spreadsheet

First, after calling the spreadsheet program to the screen, widen Column A to a field width of 20 in order to make room for student names. To widen this column, enter:

[home], then enter: / W C S 20 <ENTER>

NOTE: [home] is to move the cursor to position Cell A1.

Then set the remaining column widths by entering:

/ W G C 7 <ENTER>

Although you may set up the spreadsheet to fit your particular needs, we will illustrate the programs using the following format and titles:

COLUMN	TITLE	DATA
A	NAME	Student Name
B	GRADE	Grade Level
C	SCHOOL	School ID Number
D	NCE	Standardized Test Score
E	II	Student Behavioral Characteristics
F	III	Current Student Data
G	IV	Teacher Recommendation
H	COMP SCORE	Composite Score
I	COMP SCORE MINUS	Composite Score W/O Test Score
J	RANK	Ranking of Need for Each Individual

Step 2: Develop The Computational Overlay For The Analysis Spreadsheet

A. In order to assure that each category contributes to the composite score in the amount desired, one must determine how much weight to give each category score to obtain that contribution. (See discussion on weighting, above)

B. In addition to the percentages (proportions) of contribution you wish to assign each category, you will need to know and enter into the formulas the maximum number of possible points (inclusive range) for each category so that the computer can calculate the weights properly. In our example, we have

Category	Range	Possible Points*	Contribution
Test Score	1 -> 49**	49	30%
Student Behavioral Characteristics	0 -> 15	16	25%
Current Student Data	0 -> 6	7	20%
Teacher Recommendation	1 -> 5	5	25%
Total of Contributions		--	100%

* - The total possible points for each category are equal to the highest possible value minus the lowest possible value plus one (H - L + 1 = Possible Points), so that it will be an inclusive difference.

Our example assumes that the maximum Percentile Rank (or NCE) allowed for program eligibility is 49. The lowest Percentile Rank (or NCE) one may obtain on a standardized test is 1. Consequently, the possible range of test score differences in our example is 49 (highest) - 1 (lowest) = 48. Adding +1 to the difference makes total possible range of 49.

** - Since higher test scores denote less need, the spreadsheet program will subtract the reported Normal Curve Equivalent (NCE) from 50 and use the difference as the index of need.

Step 3: Enter the Computational Formulas

NOTE: THE FORMULAS ARE SET UP BELOW BASED ON THE SAMPLE SET OF POSSIBLE CATEGORY VALUES AND PERCENTS OF CONTRIBUTIONS LISTED IN THE TABLE ABOVE AND THE SAMPLE PRINTOUTS IN THE APPENDICES. To modify the formulas for your own needs, merely change the values in the formulas. Be sure to enter the percentages in the formulas as decimal fractions.

A. Move the cursor to Column H, Row 10 (Cell H10). The formula for calculating weighted composite scores which include standardized test scores will be calculated in this column. Enter the following formula:

```
@SUM(((50-D10)*0.3*250/49)+(E10*0.25*250/16)+(F10*0.2*250/7)+
(G10*0.25*250/5))    <ENTER>
```

Enter the copy command / C then enter:

Range From:	H10	<ENTER>
Range To:	H11..H260	<ENTER>

where the H260 is the Column and Row number containing the last name on this list.

B. Move the cursor to Cell I10. This column will contain the weighted composite scores excluding standardized testing scores in case you prefer to use this composite score for children who enter the school during the year and who do not have a test score. Enter the following formula:

@SUM((E10*.35*250/16)+(F10*.3*250/7)+(G10*.35*250/5))
<ENTER>

Note that the weights (proportions) in this column were changed in order to keep the sum of the weights for the three remaining categories equal to 1.00, but the relative ranking of importance of the categories was retained. This is necessary in order to retain comparability with the original composite scores.

Enter the copy command / C then enter:

Range From:	I10	<ENTER>
Range To:	I11..I260	<ENTER>

where the I260 is again the Column and Row number containing the last name on this list.

You should now save this spreadsheet as a master overlay so that you do not have to re-enter the formulas each time you wish to enter student data. To save the overlay, enter:

/ F S <ENTER>

when the computer responds by asking the name of the file to be saved, enter:

SSMASTER <ENTER>

Of course, you can name the overlay anything you wish within the field limits established by the program. The spreadsheet master overlay is now ready for use.

If you are using MS-DOS version 3.2 or higher, I suggest you assign the Read Only Attribute Command to this file to prevent an inadvertent save of student data to this file. This is accomplished from DOS by typing

ATTRIB +r SSMASTER.WK1 <ENTER>

Step 4: Enter The Student Data

Depending on the total number of students you plan to serve, you may enter the data by subject for each grade level separately combining schools, or by subject combining grade levels and/or schools since you can sort them later. However, you should include **ALL** students at a grade level for each basic skill subject for your initial determination of need according to Chapter 1 regulations.

To allow sorting by student name, enter the names, last name first.

Step 5: Sorting the Student Lists

The initial sort should be done by grade level for each subject if you have them on the same spreadsheet. The secondary sort will be by Composite Score within grade levels. With Lotus, You may specify a Primary Key for the initial sort (e.g. Grade Level), and a Secondary Key (e.g. Composite Scores) to rank children according to need within grade levels.

To do this sorting, enter:

/ D S D	Input Range:	A10..I260	<ENTER>
P	Primary Key:	B10	<ENTER>
Sort Order:	A	<ENTER>	(for ascending order)
Then enter:	G		

You should now see all students ranked according to grade level. To rank order the students according to need, enter:

/ D S S

Secondary Key:	H10	<ENTER>	
Sort Order:	D	<ENTER>	(for descending order)
Then enter:	G		(for Go)

The students should now be listed individually ordered from greatest need (highest Composite Score) to least need (lowest Composite Score) by grade level, district-wide. You may use this master listing for each grade level by subject to select your students for participation in Chapter 1.

Children whose scores are below your cutoff level for service may be retained on the spreadsheet (electronically) in case of subsequent referrals.

If you wish to further sort by school after you have made your selections, follow the secondary sort outlined above, but entering C10 after Secondary Key. The Sort Order could be either ascending or descending order, excluding the names of children not selected to be served using the Range command.

Also at this time, for those children who are eligible for actual program placement, you may assign a rank for each child by class by subject by school in Column I. When you finally sort alphabetically for each of these groupings, the ranks will make it easy for teachers and/or administrators to ascertain the order of need in case they cannot serve all eligible children within their school.

You may now print your listings using the LOTUS 1-2-3 program and your own printer instructions. Normally, you will only print columns A through C and I, depending on whether you wish to display the Composite Scores. This can be done by using the Border command of Lotus for Columns A through C, and specifying the data range for Column I only.

If you have questions about the procedure, or desire additional information, please write or call

Dr. Jerry A. Jenkins
Educational Testing Service
250 Piedmont Avenue, Suite 1240
Atlanta, Georgia 30308-9998
Phone: (404) 524-4501

Chapter 1 teachers and/or administrators should contact their regional Technical Assistance Centers. If the location is unknown, call the above telephone number for information. For questions regarding implementation issues within schools as pertains to Chapter 1 programs may contact

Mrs. Anne McKinney
Chapter 1 Content Specialist
201 West Burleigh Blvd.
Tavares, Florida 32778
Phone: (904) 343-3531

Grateful appreciation is extended to Dr. Gerald Richardson, Florida Department of Education and to Mrs. Anne McKinney and Mrs. Cheryl Bartch, Lake County Florida Board of Education for their insightful and thoughtful contributions toward the development of this system.

REFERENCES

Chapter 1 Selection Criteria Information Form. MIS FORM 63 F 048 5/24/82 (Rev 1/83, 3/84, 4/85), Lake County School Board, Tavares, Florida, 1985.

ECIA. Chapter 1 Basic/Migrant Student Selection. Technical Report, Lake County School Board, Tavares, Florida, 1983.

LOTUS 1-2-3 (TM) - A product of the LOTUS Development Corporation.

Note: Some spreadsheet programs, such as VISICALC (TM) - A product of Visicorp, require the addition of a small BASIC or machine language program to do the sorting of record files that are done within the LOTUS program.

APPENDIX A

Lake County, Florida Student Selection Checklist

SCHOOL BOARD OF LAKE COUNTY
TAVARES, FLORIDA
CHAPTER 1 SELECTION CRITERIA INFORMATION FORM

Student's Name_____ Grade_____
Last, First, Middle,
Student's Identification Number _ _ _ _ _ _ _ _ _ School_____

LEA Teacher's Signature_____ Date_____

%ile

I. Test Data Spring, 1986 (check appropriate test) Date of test

___ Total Reading, Stanford Early School Achievement Test, Level 2, (Kindergarten) _____

___ Total Reading, Stanford Achievement Test (Grades 1-5) _____

II. Student Behavioral Characteristics (check those that apply)

Number of checks

___ 1. Student reads poorly, haltingly, or not at all.
___ 2. Student has difficulty reading content area materials.
___ 3. Student has poor retention skills.
___ 4. Student is easily frustrated.
___ 5. Student is easily distracted.
___ 6. Student has poor self-concept.
___ 7. Student has little or no comprehension skills.
___ 8. Student is immature.
___ 9. Student lacks fine motor skills.
___ 10. Student has poor reasoning ability.
___ 11. Student does not understand the meaning of many commonly used words.
___ 12. Student has weak phonetic skills.
___ 13. Student cannot communicate ideas orally.
___ 14. Student cannot work independently.
___ 15. Student has difficulty following simple directions.

III. Current Student Record Data (check those that apply)

Number of checks

___ 1. Reading grade D or F, for any grading period, on report card or classroom grade book
___ 2. Basal reading level one semester or more below grade level
___ 3. Retained, socially promoted or administratively placed during previous year or current year.
___ 4. Served by any Chapter 1 instructional program, 1985-86
___ 5. Deficient in CORE reading skills
___ 6. Preventive strategy for reading (K-3) or lower 1/3 of reading class (4-5)

IV. Teacher Recommendations

Circle the number below which best indicates, in your professional judgment, the extent to which this student needs Chapter 1 service.

1 2 3 4 5
Little need Great need

Office Use Only

Current Grade Level:_____ Decision: Yes_____ No_____

Reason:_____

Signature:_____

_____

_____

_____

APPENDIX B

Sample Student Selection Printouts

STUDENT SELECTION SYSTEM EXAMPLE

1. Composite Score With Test Score Included
2. Composite Score With Test Score Excluded

NAME	GRADE LEVEL	SCHOOL ID	NCE	II	III	IV	COMP SCORE	COMP SCORE MINUS
Ford, Whitey	3	312	22	7	4	4	270	156
Kiner, Ralph,	5	404	9	10	5	5	374	207
Robinson, Jack	5	404	19	10	4	5	319	193
Jefferson, Tom	4	404	26	10	3	5	276	178
Jackson, Reggie	5	312	8	10	3	4	341	170
Aaron, Hank	3	312	18	12	4	5	342	211
Reagon, Ron	4	404	10	12	3	5	360	197
Johnson, Lyndon	3	404	18	13	4	5	351	221
Washington, Geo	5	404	10	9	4	4	338	175
Ruth, Babe	4	312	24	11	3	5	294	188
Kennedy, Jack	3	312	10	11	3	5	351	188
Rose, Pete	4	404	17	8	3	5	294	160
Wilson, Woodrow	4	312	22	8	4	5	288	174
Lincoln, Abe	4	404	25	11	3	5	290	188
Jackson, Andrew	3	312	20	11	4	5	324	202
Cobb, Ty	3	404	22	15	3	5	339	225
Nixon, Richard	4	312	7	8	3	5	335	160
Adams, John	5	404	4	13	5	5	423	235
Gibson, Bob	3	312	14	10	3	5	325	178
Truman, Harry	4	404	24	9	3	5	275	169
Banks, Ernie	5	404	12	10	4	4	339	184
Harding, Warren	4	312	1	15	4	5	439	240
Gehrig, Lou	4	404	15	11	3	5	331	188
Carter, Jimmy	5	404	7	12	5	5	401	226
Mantle, Mickey	5	312	28	9	4	4	265	175
Byrd, Larry	4	312	37	8	3	4	204	151

STUDENT SELECTION SYSTEM EXAMPLE

1. Composite Score With Test Score Included
2. Composite Score With Test Score Excluded

NAME	GRADE LEVEL	SCHOOL ID	NCE	II	III	IV	COMP SCORE	COMP SCORE MINUS
Johnson, Lyndon	3	404	18	13	4	5	351	221
Kennedy, Jack	3	312	10	11	3	5	351	188
Aaron, Hank	3	312	18	12	4	5	342	211
Cobb, Ty	3	404	22	15	3	5	339	225
Gibson, Bob	3	312	14	10	3	5	325	178
Jackson, Andrew	3	312	20	11	4	5	324	202
Ford, Whitey	3	312	22	7	4	4	270	156
Harding, Warren	4	312	1	15	4	5	439	240
Reagon, Ron	4	404	10	12	3	5	360	197
Nixon, Richard	4	312	7	8	3	5	335	160
Gehrig, Lou	4	404	15	11	3	5	331	188
Rose, Pete	4	404	17	8	3	5	294	160
Ruth, Babe	4	312	24	11	3	5	294	188
Lincoln, Abe	4	404	25	11	3	5	290	188
Wilson, Woodrow	4	312	22	8	4	5	288	174
Jefferson, Tom	4	404	26	10	3	5	276	178
Truman, Harry	4	404	24	9	3	5	275	169
Byrd, Larry	4	312	37	8	3	4	204	151
Adams, John	5	404	4	13	5	5	423	235
Carter, Jimmy	5	404	7	12	5	5	401	226
Kiner, Ralph,	5	404	9	10	5	5	374	207
Jackson, Reggie	5	312	8	10	3	4	341	170
Banks, Ernie	5	404	12	10	4	4	339	184
Washington, Geo	5	404	10	9	4	4	338	175
Robinson, Jack	5	404	19	10	4	5	319	193
Mantle, Mickey	5	312	28	9	4	4	265	175

STUDENT SELECTION SYSTEM EXAMPLE

1. Composite Score With Test Score Included
2. Composite Score With Test Score Excluded

NAME	GRADE LEVEL	SCHOOL ID	NCE	II	III	IV	COMP SCORE	COMP SCORE MINUS	NEED RANK
Kennedy, Jack	3	312	10	11	3	5	351	188	1
Aaron, Hank	3	312	18	12	4	5	342	211	2
Gibson, Bob	3	312	14	10	3	5	325	178	3
Jackson, Andrew	3	312	20	11	4	5	324	202	4
Ford, Whitey	3	312	22	7	4	4	270	156	*
Harding, Warren	4	312	1	15	4	5	439	240	1
Nixon, Richard	4	312	7	8	3	5	335	160	2
Ruth, Babe	4	312	24	11	3	5	294	188	*
Wilson, Woodrow	4	312	22	8	4	5	288	174	*
Byrd, Larry	4	312	37	8	3	4	204	151	*
Jackson, Reggie	5	312	8	10	3	4	341	170	1
Mantle, Mickey	5	312	28	9	4	4	265	175	*
Johnson, Lyndon	3	404	18	13	4	5	351	221	1
Cobb, Ty	3	404	22	15	3	5	339	225	2
Reagon, Ron	4	404	10	12	3	5	360	197	1
Gehrig, Lou	4	404	15	11	3	5	331	188	2
Rose, Pete	4	404	17	8	3	5	294	160	*
Lincoln, Abe	4	404	25	11	3	5	290	188	*
Jefferson, Tom	4	404	26	10	3	5	276	178	*
Truman, Harry	4	404	24	9	3	5	275	169	*
Adams, John	5	404	4	13	5	5	423	235	1
Carter, Jimmy	5	404	7	12	5	5	401	226	2
Kiner, Ralph,	5	404	9	10	5	5	374	207	3
Banks, Ernie	5	404	12	10	4	4	339	184	4
Washington, Geo	5	404	10	9	4	4	338	175	5
Robinson, Jack	5	404	19	10	4	5	319	193	6

* - NOT ELIGIBLE FOR CHAPTER 1 PROGRAM

STUDENT SELECTION SYSTEM EXAMPLE

1. Composite Score With Test Score Included
2. Composite Score With Test Score Excluded

NAME	GRADE LEVEL	SCHOOL ID	NCE	II	III	IV	COMP SCORE	COMP SCORE MINUS	NEED RANK
Aaron, Hank	3	312	18	12	4	5	342	211	2
Ford, Whitey	3	312	22	7	4	4	270	156	*
Gibson, Bob	3	312	14	10	3	5	325	178	3
Jackson, Andrew	3	312	20	11	4	5	324	202	4
Kennedy, Jack	3	312	10	11	3	5	351	188	1
Byrd, Larry	4	312	37	8	3	4	204	151	*
Harding, Warren	4	312	1	15	4	5	439	240	1
Nixon, Richard	4	312	7	8	3	5	335	160	2
Ruth, Babe	4	312	24	11	3	5	294	188	*
Wilson, Woodrow	4	312	22	8	4	5	288	174	*
Jackson, Reggie	5	312	8	10	3	4	341	170	1
Mantle, Mickey	5	312	28	9	4	4	265	175	*
Cobb, Ty	3	404	22	15	3	5	339	225	2
Johnson, Lyndon	3	404	18	13	4	5	351	221	1
Gehrig, Lou	4	404	15	11	3	5	331	188	2
Jefferson, Tom	4	404	26	10	3	5	276	178	*
Lincoln, Abe	4	404	25	11	3	5	290	188	*
Reagon, Ron	4	404	10	12	3	5	360	197	1
Rose, Pete	4	404	17	8	3	5	294	160	*
Truman, Harry	4	404	24	9	3	5	275	169	*
Adams, John	5	404	4	13	5	5	423	235	1
Banks, Ernie	5	404	12	10	4	4	339	184	4
Carter, Jimmy	5	404	7	12	5	5	401	226	2
Kiner, Ralph,	5	404	9	10	5	5	374	207	3
Robinson, Jack	5	404	19	10	4	5	319	193	6
Washington, Geo	5	404	10	9	4	4	338	175	5

* - NOT ELIGIBLE FOR CHAPTER 1 PROGRAM

STUDENT SELECTION SYSTEM EXAMPLE

NAME	GRADE LEVEL	SCHOOL ID	NEED RANK
Aaron, Hank	3	312	2
Ford, Whitey	3	312	*
Gibson, Bob	3	312	3
Jackson, Andrew	3	312	4
Kennedy, Jack	3	312	1
Byrd, Larry	4	312	*
Harding, Warren	4	312	1
Nixon, Richard	4	312	2
Ruth, Babe	4	312	*
Wilson, Woodrow	4	312	*
Jackson, Reggie	5	312	1
Mantle, Mickey	5	312	*
Cobb, Ty	3	404	2
Johnson, Lyndon	3	404	1
Gehrig, Lou	4	404	2
Jefferson, Tom	4	404	*
Lincoln, Abe	4	404	*
Reagon, Ron	4	404	1
Rose, Pete	4	404	*
Truman, Harry	4	404	*
Adams, John	5	404	1
Banks, Ernie	5	404	4
Carter, Jimmy	5	404	2
Kiner, Ralph,	5	404	3
Robinson, Jack	5	404	6
Washington, Geo	5	404	5

* - NOT ELIGIBLE FOR CHAPTER 1

APPENDIX C

Setting Up Data Files for Lotus from Main Frame Computers

HOW TO SET UP DATA FILES FOR LOTUS 1-2-3 FROM WORD PROCESSING PROGRAMS OR MAIN FRAME COMPUTER TAPES

Dr. Jerry A. Jenkins
Educational Testing Service

1. If the data are coming from a main frame computer, transfer it either directly using a tape drive or a modem (at least 1200 B.P.S. is recommended).

2. From a word processing program or the main frame, save the file inASCII code following the specifications listed in paragraph 3, below. The data file must have a name not exceeding eight characters and an extension named .PRN.

3. The data set may be transferred to Lotus using the Import command. In addition to being in ASCII, the data file must meet the following conditions:

a. All string variables must be enclosed in double quotation marks ("). Values must not be so enclosed.

b. Each variable field must be separated by the equivalent of two Lotus blank columns of any width. Lotus recognizes the beginning and end of a variable field by these blank columns. The data will be placed in appropriate and consecutive columns on the Lotus spreadsheet when Imported.

c. All data cells must have some value. If the value is zero, enter a 0: do not leave it blank.

d. To Import a file, type as follows:

/ File Import Numbers *Drive:Filename* <ENTER>

The file should appear on the spreadsheet after a short pause for loading.

4. When the analysis is finished, and if you do not use a data compression program such as SQZ!, you may substantially reduce the size of the file on your disk by saving it as a .PRN file. To do so, save the file according to the following specifications:

a. Re-insert quotation marks before and after the string variables using the Copy command. To do this, you must first insert columns for them on the spreadsheet before all string variables and after the last string variable. Place the cursor in column 1, then type

/ Worksheet Insert Column

b. Repeat this at the start of each string variable column and after the last one. Enter a double quotation mark in column 1 ("). It will not show up on the spreadsheet, but you will see it in the Command Row. Copy it to as many rows as you want to save.

For all remaining new columns, enter two consecutive double quotation marks ("") to serve as the end of one string variable and the start of the next. Only one of the two double quotation marks will show up on the spreadsheet, but both will be visible in the Command Row. Copy down as needed. Last, place one double quotation mark (") in the blank column following the last string variable, and copy it as needed.

c. Type: / Print File *Drive:Filename* <ENTER>

d. Range (set to as much of the file as you wish to save, usually, cell A1 to the end of the file).

e. Margins Top = 0
Bottom = 0
Left = 0
Right = 240

f. Other Unformatted

g. Quit Align Go

The file should now be saved in .PRN ASCII format on the selected diskette.

Appreciation for assistance in developing this techniques is extended to Dr. Gerald Richardson, Florida Department of Education.

APPENDIX D

A Sampling of Technical Reports

Technical Reports of Statistical Analyses and Quality Assurance Activities for System Validation

Report Number	Title
1*	Determination and Validation of Preference of Order of Importance of Categories of Student Information
2*	Quality Control Review Procedures of Completed Checklists
3*	Content Analysis of Category V (Additional Information)
4	Analysis of Patterns of Checkmarks of Items in Categories II (Student Behavioral Characteristics) and III (Current Student Data)
5	Analysis of Student Ratings of Categories II and III
6	Categorical Intercorrelation Matrix Analysis
7	Determination of Selection System "Hit" and "Miss" Rate
8	Analysis of Selection System Classification Efficiency
9	Regression Analysis of Predictive Efficiency of the Checklist In Estimating Student Standardized Test Scores
10	Analysis of Intraclass Reliability and Consistency of Checklist Data

* - Reports not included but available upon individual request.

Analysis of Patterns of Checkmarks of Items in
Categories II (Student Behavioral Characteristics) and III
(Current Student Record Data)

Technical Report 4

Purpose: To determine whether any items were sufficiently not contributory as to receive few or no checkmarks. Also, to determine whether the numbers of checkmarks for the items varied among the items as to suggest that individual judgments were made by teachers for each child.

Procedure: Tally the number of checkmarks for each item in each of the two categories (see attachment).

Results: Two items in category II (items 9 and 13) were checked only 30% to 50% as much as the other items. All other items in both categories were checked from 38% to 66% of the time for the number of students assessed, with considerable variation among items.

Conclusion: All items were determined to be useful in discriminating among students with various degrees of educational need. Sufficient variability in numbers of checks existed as to indicate the raters (i.e. teachers filling out the forms) made individual judgments among item descriptions for each child.

Analysis of Student Ratings of Categories II and III

Technical Report 5

Purpose: To determine whether raters were giving most children the maximum or minimum number of checks in order to assure either the selection or non-selection of a student for Chapter 1 participation, depending on the rater's (teacher's) overall feeling about a particular child.

Procedure: Compute and tabulate the numbers of children indicated for each possible number of checks for Categories II (Characteristics of Children) and III (Current School Data). Test for significance of variance in numbers of students listed for each of the items through the use of the chi square one variable statistical test, at the .05 probability level.*

Results: The statistical tests revealed that the number of children listed by number of checkmarks received, varied significantly ($p < .01$) for both categories II and III. Inspection of the data suggests that the significance is due to relatively large frequencies at zero checkmarks and relatively few checks at the maximum number end of the distribution. The range of high to low numbers of checkmarks was approximately 10%.

Conclusion: The distributions appear to be consistent with expectations of selective ratings by raters, thus the category items appear to be appropriate for use.

* **Reference:** Statistical Inference, Helen M. Walker and Joseph Lev. Holt, Rinehart and Winston, 1953. pp. 84-86.

Categorical Intercorrelational Matrix Analysis

Technical Report 6

Purpose: To determine whether the information from the five categories is consistent (reliable), across categories.

Procedure: Compute an intercorrelation matrix of the student values for the five categories; test the statistical significance of the resultant coefficients.

Results: Simple Pearson Product Moment Correlation analysis resulted in values ranging from a low of .128 to a high of .614 on a scale ranging from zero (no relationship) to 1.00 (perfect relationship). All values were found to be statistically significant when tested at the .001 probability level.*

Conclusions: All categories of information contributed to the decision. However, the fourth category (Additional Information) correlated with the other categories only minimally. Thus, based on this finding and that found in the content analysis, it would appear to not reduce the accuracy of the checklist decision value to remove this category from further use.

* **Reference:** A General Model for Multivariate Analysis. Jeremy D. Finn. Holt, Rinehart and Winston, Inc., 1974. pp. 175-180.

Determination of Selection System "Hit" and "Miss" Rate

Technical Report 7

Purpose: (1) To determine the accuracy of the system in identifying students in need of Chapter 1 services and those not in need, from the initial pool of eligible students.

(2) To compare the proportion of students who enter the school district after the start of the fall term (new students) where no standardized test is administered, and who are selected, as compared to the proportion selected during the initial selection period where a standardized test score was included in the selection process.

Procedure: Students were categorized as either "In" the Chapter 1 program or "Out" (not in), and, whether their participation (or lack thereof) was due to the original determination of the system, whether it was a result of a change from the original determination, or a new (subsequently enrolled and placed) student. Proportions of "selected" to total for new students was compared to proportions obtained as a result of the original selection process.

Results: Overall, the system correctly identified and placed 94.3% of the eligible children for whom a checklist was prepared. The proportion of children originally selected from the initial group eligible was 72.6%. From the "New" group, 87.8% were selected to participate.

Conclusions" Since only 5.7% of the students had to be changed from their original selection determination, and since some of these are likely due to over-the-summer maturation, the selection system seems to be highly efficient and accurate. The higher "selection to total" percentage for new students is plausible since many of the new students are transient and/or migrant with a probable higher educational deprivation rate among the students.

STUDENT SELECTION RESULTS

	(IN) SELECTED	(OUT) NON-SELECTED	TOTALS
ORIGINAL	1,089	412	1,501
CHANGED	68	22	90
NEW	344	48	392
TOTAL	1,501	482	1,983

Analysis of Selection System Classification Efficiency

Technical Report 8

Purpose: To determine whether the checklist score categorical profiles of students participating in Chapter 1 is statistically different from those students eligible for, but not selected for participation.

Procedure: The categorical scores of students were examined through the use of the Multiple Discriminant Analysis. Significance was set at the .05 probability level.*

Results: Even with the inclusion of scores of students who were "missed" by the system in place, the results of the analysis showed the selection system to be effective in properly placing the children with only a very remote possibility of being ineffective ($p < .0001$). The Eigenvalue for this analysis was 1.507, and the Cannonical Correlation between predictor and criterion variables coefficient was .775.

Conclusion: As with all other indicators, this powerful analytic technique suggests that this selection system is highly efficient and accurate.

* **Reference:** Finn, Op. Cit., pp. 357-363.

Regression Analysis of the Predictive Efficiency of the Checklist in Estimating Student Standardized Test Scores

Technical Report 9

Purpose: To demonstrate the effectiveness of the system in properly selecting students where no standardized test score is available for the students.

Procedure: A multiple linear regression equation was developed to ascertain what combinations of category values would be equivalent to a percentile rank of 49 or lower. The Fisher Modification of the Doolittle Method of Solving Normal Equations by Successive Elimination technique was used to achieve the solution.*

Results: An equation was derived based on a multiple correlation coefficient of .456, with a Standard Error Measurement being 8.11. The checklist categorical profile equivalent to a Percentile Rank of 49 is (a) five (5) student characteristic checks, three (3) current data checks, and a positive teacher recommendation for placement into the program.

Conclusion: Use of the checklist without the inclusion of a standardized test score will yield highly accurate results in terms of proper selection decisions. An unexpected outcome of the analysis is the importance of a positive recommendation from the teacher in order to be at or below the 49th percentile rank using the equation. If the teacher does not recommend for placement into the program, maximum values in the remaining checklist categories is needed to remain at or below the 49th percentile.

The large Standard Error of Measurement was found to be primarily a function of the standardized test error and to a very little extent related to checklist error.

* **Reference:** Walker and Lev. *Op. Cit.* pp. 331-336.

ANALYSIS OF INTRACLASS RELIABILITY AND CONSISTENCY OF CHECKLIST DATA

The data set analyzed consisted of 4th through 6th grade reading checklist data. I collapsed data cells which had been grouped by school and by grade level into a single data base for analysis in order to gain statistical power. This gave me a total of 198 usable sets of individual scores.

Three analyses were undertaken. The first analysis, computation of a correlation matrix of checklist category scores, was conducted to determine the consistency of the checklist category coefficients over occasions. This was accomplished by comparing coefficients obtained from the 1986 data with the Lake County, Florida correlation coefficients derived from the original data set in 1982.

The second analysis estimated intraclass correlations using the repeated measures analysis of variance. This provides the mean reliability of a set of measurements and is defined as the variance due to true scores divided by the sum of the variance due to true scores and the variance due to the mean of the errors of measurement. This technique also allows the estimation of the reliability of a single measurement (r_1) given the reliability of k measures (r_k). Intraclass correlations were computed where the standardized norm-referenced achievement test score effect was included in the matrix and again where the scores were not included.

The third analysis was an examination of the inter-relationships of composite scores (including then excluding standardized test scores).

These analyses were undertaken to answer two questions:

(1) Will the inter-relationships among category scores remain consistent over occasions?

(2) Will there be a significant deterioration (or increase) in the reliability of selection if standardized norm-referenced test scores are removed from each of the selection analyses?

The data were organized and analyzed using the LOTUS 1-1-2 (TM) spreadsheet program and the microcomputer version of S.P.S.S.+ (TM). To assure linearity and in order to have an equitable base for direct comparisons, I converted all data into proportions followed by arcsin transformations using the formula (2* arcsin of sqrt of X where X is a proportion).

The data were prepared for analysis using the following rankings/weights:

Category	Score Range	Rank	Contribution	Weights	Composite Score
I	49	2	30%	3.06	150
II	16	1	40%	12.50	200
III	7	4	10%	7.14	100
IV	5	3	20%	20.00	50

	Maximum Possible Composite Score				500

The results of these analyses are very encouraging and are summarized below.

QUESTION #1: Are the checklist category correlation coefficients consistent across occasions?

FINDING: Yes, both in pattern and in general strength.

CONCLUSION: The categories will provide reliable information regarding student need as defined by the checklist.

ORIGINAL SAMPLE DATA MATRIX
(N = 1,800)

	I	II	III	IV
I	0	-.414	-.419	-.364
II	*	0	.631	.614
III	*	*	0	.509
IV	*	*	*	0

NEW SAMPLE DATA MATRIX
(N = 200)

	I	II	III	IV
I	0	-.369	-.486	-.414
II	*	0	.525	.761
III	*	*	0	.539
IV	*	*	*	0

CODE:

I = Standardized Test Scores
II = Student Behavioral Characteristics
III = Current Student Data
IV = Teacher Recommendation

NOTE: Inverse relationships of test scores with the other variables are expected since a higher test score indicates less educational need, while higher values associated with the remaining variables indicate greater need.

QUESTION #2: Of what size are the intraclass correlations of checklist data, and how are they affected by exclusion of standardized norm-referenced achievement test data?

FINDING: The intraclass correlations are very strong and not significantly affected by the exclusion of test score data.

CONCLUSION: The checklist should provide highly reliable results with or without the inclusion of standardized test data.

Intraclass Reliability of the Checklist With Data Included From All Four Categories

$r_4 = .796 \qquad (n = 200)$

$P(.737 < \rho < .843) = .05$

The estimated average reliability coefficient for each category is:

$r_1 = .493 \qquad (n = 200)$

$P(.377 < \rho < .592) = .05$

Intraclass Reliability of the Checklist With Standardized Test Data Removed

$r_4 = .816 \qquad (n = 200)$

The estimated average reliability coefficient for each category is:

$r_1 = .579 \qquad (n = 200)$

Although the two r_k coefficients and the two r_1 coefficients do not differ significantly between groupings as determined by examination of the Confidence Intervals computed for the original values, it is interesting to note that the coefficients appear to increase slightly rather than decrease in strength when test data are excluded from consideration.